

PATENT COOPERATION TREATY

REC'D 22 MAR 2005

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From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

Griffith Hack
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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

15 MAR 2005

Applicant's or agent's file reference
FP20995

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/AU2005/000020

International filing date (day/month/year)

11 January 2005

Priority date (day/month/year)

2 February 2004

International Patent Classification (IPC) or both national classification and IPC

Int. Cl. ⁷ G01M 11/02, A61B 3/12, G01J 9/00

Applicant

IATIA IMAGING PTY LTD et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the IPEA/AU

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**WRITTEN OPINION OF THE
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Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item:
☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material
☐ a sequence listing
☐ table(s) related to the sequence listing
 - b. format of material
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☐ paid additional fees
- ☐ paid additional fees under protest
- ☐ not paid additional fees
2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
- ☒ not complied with for the following reasons:

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1 – 15 are directed towards an apparatus and method for compensating for aberrations in an optical system in which data relating to measured aberrations are used to correct an image. It is considered that the application of a transformation based on phase data to an image to correct for aberrations in the image comprises a first "special technical feature".
2. Claims 16 & 17 are directed towards an apparatus and method for measuring aberrations in an optical system. It is considered that the measurement of the aberrations in an optical system based on measured phase data comprises a second special technical feature.

The feature common to all of the claims is the measurement of aberrations in an optical system using phase data. However this common feature is well known in the art in the form of Hartmann or Shack-Hartmann wavefront sensors, for example. These sensors measure the shape of a wavefront after it has passed through an optical system, wherein the wavefront is a surface of constant phase. Hence these sensors measure phase data. From the shape of the wavefront compared with a reference shape of an undistorted wavefront, any aberrations in the system are measured. Consequently the common feature does not constitute "a special technical feature" within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over the prior art. Since there exists no other common feature which can be considered as a special technical feature within the meaning of PCT Rule 13.2, second sentence, no technical relationship within the meaning of PCT Rule 13 between the different inventions can be seen. Consequently the claims do not satisfy the requirement of unity of invention a posteriori.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☒ all parts
- ☐ the parts relating to claims Nos.

**WRITTEN OPINION OF THE
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International application No.

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 15	YES
	Claims 1 – 14, 16, 17	NO
Inventive step (IS)	Claims	YES
	Claims 1 – 17	NO
Industrial applicability (IA)	Claims 1 – 17	YES
	Claims	NO

2. Citations and explanations:

The following documents identified in the International Search Report have been considered as relevant for the purposes of this report:

D1: US 6 331 059

D2: Primot et al. Deconvolution from wave-front sensing: a new technique for compensating turbulence-degraded images.

D3: WO 2002/035995

D4: WO 1998/027863

Novelty (N) (claims 1 – 14, 16 & 17)

Claims 1, 8 & 12: D1 discloses an apparatus and method for compensating for the effect of aberrations in an optical system on an acquired image, and explicitly incorporates D2 as including the details of the calculations. The method of D1 includes simultaneously acquiring two images – one of a beam of light that is directed through the system and measured on a Shack-Hartmann wavefront sensing module, and the other a retinal image taken by a high resolution CCD detector. As discussed in Box IV, and as shown in D2 (see Section 2), the Shack-Hartmann wavefront sensing module produces phase data regarding the measured wavefront. The optical transfer function of the optical system is calculated from the phase data measured by the Shack-Hartmann sensor (see D2 for the details of this calculation, as referenced in D1). A transformation which includes the optical transfer function is defined such that if applied to the measured beam of light, the reference, undistorted wavefront would be recovered (see equations 1 – 3 of D2). This transformation is then applied to the image data, resulting in the removal of high order aberrations. D1, incorporating the details included in D2, therefore teaches all of the features of claims 1 & 8 and hence these claims lack novelty.

Claims 2 – 7, 9 – 11, 13 & 14: The features of claims 2 – 7, 9 – 11, 13 & 14 are also disclosed in D1 and hence these claims also lack novelty in light of this document.

Claims 16 & 17: In the method of D1, one of the steps involved includes the calculation of the aberrations in the optical system which are to be corrected. Hence, claims 16 & 17 also lack novelty in light of this document.

D3 & D4 both disclose apparatus and methods for measuring the aberrations of an optical system in which a beam of light that is directed through the optical system is measured on a wavefront sensor. As discussed above, wavefront sensors measure phase data relating to the shape of the wavefront. Aberrations in the measured wavefront are then compared to the reference wavefront that would be produced if no aberrations were present. This results in the determination of the aberration in the optical system. Claims 16 & 17 therefore lack novelty in light of both D3 & D4.

(Continued on Supplemental Sheet)

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient:

Continuation of: Box V

Inventive Step (IS) (claims 1 – 17)

Claims 1 – 14, 16 & 17: These claims also lack an inventive step for the reasons given above.

Claim 15: The feature added by dependent claim 15, that the monitor for displaying an image of the fundus is included in the camera, lacks an inventive step in light of D1. D1 discloses a monitor that is external to the camera, but the inclusion by the person skilled in the art of this monitor within the camera is not considered inventive.